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Title: Association between temperature and death among elderly people in England 2012/13-2013/14: a case-crossover design

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Introduction/ Objectives:

Around 24,000 extra deaths occur annually in winter in England and Wales. NICE guidance suggests GPs should identify patients most at risk. We investigated whether socio-demographic and clinical characteristics could predict cold-related mortality.

Methods:

Data on over 500,000 patients aged 65+ from the Clinical Practice Research Datalink (CPRD) were linked with ONS death registration to CPRD, yielding 34,777 patients who died between April 2012 and March 2014. We used daily temperature data from the Met Office to calculate absolute mean temperature and difference from average monthly temperature (relative temperature) for the date of death and three days previously. In a case-crossover analysis, we also calculated both temperature measures for the 14th day before and the 14th day after the date of death. Patients living in an institution were identified using the CPRD family number (at least three individuals over 65 living in same address). From linked Hospital Episode Statistics, we determined whether an emergency hospital admission occurred two years before death to indicate previous health status. Deprivation level and house energy efficiency were determined from patient's and practice's Lower Super Output Area: the latter used information from the Centre for Sustainable Energy. Conditional logistic regression models were applied to estimate the odds ratio (OR) of death associated with temperature and interactions between temperature and socio-demographic, medical and house quality characteristics were expressed as relative odds ratios (RORs).

Results:

Higher absolute temperature was associated with lower risk of death (OR 0.985 per 1^{o}C; 95% CI 0.975-0.992; p=<0.001). There was weak evidence of a positive association between risk of death and higher relative temperature (OR 1.008 per 1^{o}C; CI 95% 0.999-1.017; p=0.056). No clear interactions were found between temperature measures and age, gender, living in urban or rural areas, deprivation level, or house energy efficiency in either bivariable or multivariable analyses. There was some evidence for a stronger effect of higher relative temperature for those living in an institution (ROR 1.025; 95% CI 1.002-1.048; p=0.03), but not in multivariable analysis. Effects of temperature measures differed between those who had none vs at least one previous emergency admission: ORs for absolute temperature were 0.970 and 0.988 per 1^{o}C, with ROR 1.018, 95%CI 0.998-1.039, p=0.079. For relative temperature ORs were 1.033 and 1.003, with ROR 0.974, 95%CI 0.951, 0.997, p=0.025, suggesting for those who had been in hospital less impact of relative temperature.

Conclusions

Recommendations for GPs to identify those at highest risk during cold weather cannot be supported by these results.